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EXAMINER	
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2884	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/809,066	MICKAEL, MEDHAT
	Examiner	Art Unit
	Faye Polyzos	2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/04, 5/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by *Paske et al (US 4,698,501).*

Regarding claim 1, Paske discloses a gamma ray logging-while-drilling system (10) comprising: (a) at least one gamma ray detector (52) that measures a gamma ray energy spectrum (col. 6, lines 34-53); wherein (b) a first adjustment of gain of the detector is made using a measure of slope of a Compton scatter region of the spectrum (See Figs. 2 and 7 and col. 9, lines 21-32 and claim 1).

Regarding claim 21, Paske discloses a method for measuring gamma radiation while drilling a borehole, the method comprising the steps of: (a) measuring a gamma ray spectrum (col. 6, lines 34-53) with at least one gamma ray detector (52): and (b) making a first adjustment of gain of the detector using a measure of slope of a Compton scatter region of the spectrum (See Figs. 2 and 7 and col. 9, lines 21-32 and claim 1).

3. Claims 13, 33, 41 and 45 are rejected under 35 U.S.C. 102(b) as being anticipated by *Galford et al (US 5,120,955 A).*

Regarding claim 13, Galford discloses a gamma ray logging-while-drilling system comprising: (a) at least one gamma ray detector (18) that measures a gamma ray

energy spectrum (col. 7, lines 5-11); (b) a calibration source disposed near or within the at least one detector and emitting calibration radiation (i.e. calibration blocks) (col. 7, lines 36-50); and (c) dual gain circuitry comprising a standard amplification circuit and a high gain circuit (col. 10, lines 13-25); (d) the spectrum is branched and input into the dual gain circuitry producing a standard gain spectrum and an amplified gain spectrum; (e) in the amplified gain spectrum, the observed position of a calibration peak from the calibration radiation is compared with a predetermined standard position for the calibration peak (col. 7, lines 5-50); and (f) results of the comparison are used to correct the standard gain spectrum to a standard detector gain (col. 11, lines 14-45).

Regarding claim 33, Galford discloses a method for measuring gamma radiation while drilling a borehole, the method comprising the steps of: (a) measuring a gamma ray energy spectrum with at least one gamma ray detector (18) (col. 7, lines 5-11); (b) disposing a calibration source near or within the at least one detector; (c) measuring within the gamma ray energy spectrum calibration radiation emitted by the calibration source (i.e. calibration block) (col. 7, lines 36-50); (d) providing a dual gain circuitry comprising a standard amplification circuit and a high gain circuit (col. 10, lines 13-25); (e) branching the spectrum into the dual gain circuitry thereby producing a standard gain spectrum and an amplified gain spectrum; (f) in the amplified gain spectrum, observing a position of a calibration peak resulting from the calibration radiation (col. 7, lines 5-50); (g) comparing the observed position with a predetermined standard position for the calibration peak; and (h) using the comparison to correct the standard gain spectrum to a standard detector gain (col. 11, lines 14-45).

Regarding claim 41, Galford discloses a gamma radiation logging-while-drilling system for measuring elemental concentration of at least one naturally occurring radioactive element in a formation penetrated by a borehole, the system comprising: (a) at least one gamma ray detector (18) (col. 7, lines 5-11); (b) a calibration source in the vicinity of the at least one gamma ray detector; wherein (c) the gamma ray detector measures a gamma ray spectrum comprising a first component from the at least one naturally occurring radioactive element and a second component from the calibration source; (d) a first detector gain correction is determined from features of the first component; (e) a second detector gain correction is determined from the second component; and (f) the first and the second gain corrections are combined to correct for gain shift in the gamma ray detector (See Abstract and col. 7, lines 5-50, col. 10, lines 13-25 and col. 11, lines 14-45).

Regarding claim 45, Galford discloses a method for measuring, while drilling a borehole, elemental concentration of at least one naturally occurring radioactive element contained in formation penetrated by the borehole, the method comprising the steps of: (a) conveying at least one gamma ray detector (18) within the borehole (col. 7, lines 5-11); (b) disposing a calibration source in the vicinity of the at least one gamma ray detector; (c) measuring with the at least one gamma ray detector, a gamma ray spectrum comprising a first component from the calibration source; (d) determining a first detector gain correction from features of the first component; (e) determining a second detector gain correction from the second component; (f) combining the first and the second detector gain correction to correct for gain shift in

the at least one gamma ray detector (See Abstract and col. 7, lines 5-50, col. 10, lines 13-25 and col. 11, lines 14-45).

4. Claims 49, 52, 53, and 56 are rejected under 35 U.S.C. 102(b) as being anticipated by *Hubner et al (US 4,524,273).*

Regarding claim 49, Hubner discloses a gamma ray logging-while-drilling system comprising (a) at least one gamma ray detector; and a processor operationally connected to the at least one detector; wherein (c) the gamma ray detector cooperates with the processor to yield a spectrum comprises gamma ray count rate recorded as a function of energy channel (col. 19, lines 58-68 and col. 20, lines 1-3 and lines 17-59).

Regarding claim 52, Hubner discloses the system wherein: (a) the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) the spectrum is combined with calibration constants in the processor using a predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46).

Regarding claim 53, Hubner discloses a method for measuring gamma radiation while drilling a borehole, the method comprising the steps of: (a) disposing at least one gamma ray detector within the borehole; (b) operationally connecting a processor to the at least one detector; and (c) with the processor cooperating with the at least one gamma ray detector, measuring an energy spectrum of the gamma radiation comprising gamma ray count rate recorded as a function of energy channel (col. 19, lines 58-68 and col. 20, lines 1-3 and lines 17-59).

Regarding claim 56, Hubner discloses the method wherein (a) the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) the spectrum is combined with calibration constants in the processor using a predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2-11 and 22-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Paske et al (US 4,698,501)* as applied to claim 1 above, and further in view of *Hubner et al (US 4,524,273).*

Regarding claim 2, Paske discloses a gamma ray logging-while-drilling system (10) comprising: (a) at least one gamma ray detector (52) that measures a gamma ray energy spectrum (col. 6, lines 34-53); wherein (b) a first adjustment of gain of the detector is made using a measure of slope of a Compton scatter region of the spectrum (See Figs. 2 and 7 and col. 9, lines 21-32 and claim 1). Paske does not disclose of a second adjustment of the gain made by measuring location of an energy peak in the spectrum. Hubner discloses a gamma ray logging-while-drilling system wherein an adjustment of the gain is made by: measuring the location of an energy peak in the

spectrum; and adjusting the gain so that the location corresponds to a standard location for the energy peak (col. 20, lines 1-3 and lines 17-36). Hubner teaches it will be appreciated from the foregoing that a change in the gamma ray detector transfer characteristics due to variations in high voltage supplies such as drift and the like, will result in apparent shifts in the cesium monitor peak locations such as the channel locations corresponding to the various A-D converters. Moreover, also as previously indicated, such shifts may be corrected for by adjusting the high voltage supplies in response to the control signals derived from detection of the monitor peaks so as to bring these perceived cesium monitor peak energy locations into the appropriate range or channel/window location (col. 20, lines 17-36). Therefore, it would have been obvious to modify the system disclosed by Paske, to include a second adjustment of the gain of the detector, to measure location of an energy peak, as disclosed supra by Hubner, to allow for a more versatile logging-while-drilling system.

Regarding claim 3, Hubner discloses the system wherein another adjustment is made by (a) measuring locations of a plurality of energy peaks in the spectrum; (b) adjusting the gain so that each the locations of each of the plurality of peaks corresponds to a standard location for that peak (col. 20, lines 17-37).

Regarding claim 4, Hubner discloses the system comprising a processor cooperating with the at least one detector wherein: (a) the spectrum comprises gamma ray count rate recorded as a function of energy channel within the processor; and (b) the first adjustment comprises adjusting, within the processor, width of the energy channels as a function of the measure of slope (col. 20, lines 37-59).

Regarding claim 5, Hubner discloses the system wherein the second adjustment comprising adjusting, within the processor, the width of the energy channel so that the location of the energy peak corresponds to a standard location for the energy peak (col. 19, lines 58-68 and col. 20, lines 1-3 and lines 17-36).

Regarding claim 6, Hubner discloses the system further comprising an adjustable high voltage power supply cooperating with the processor and the at least one detector, wherein the third adjustment comprising adjusting high voltage supplied to the at least one detector thereby setting the gain of the at least one detector to a standard gain (col. 1, lines 39-51 and col. 4, lines 7-19).

Regarding claim 7, Paske discloses the system further comprising a collar (15), wherein the at least one detector (52) is disposed in a detector channel at the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53).

Regarding claim 8, Paske discloses the system further comprising a collar (15), wherein two or more detectors (52)(53) are disposed in a detector channel at the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53).

Regarding claim 9, Hubner discloses the system wherein (a) the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) the spectrum is combined with calibration constants in the processor using a predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46).

Regarding claim 10, Hubner discloses the system wherein at least one elemental concentration is measured as a function of depth within the borehole (col. 10, lines 10-34).

Regarding claim 11, Paske discloses the system wherein at least one elemental concentration is measured as a function of azimuthal sector around the borehole (col. 7, lines 1-10).

Regarding claim 22, Paske discloses a method for measuring gamma radiation while drilling a borehole, the method comprising the steps of: (a) measuring a gamma ray spectrum (col. 6, lines 34-53) with at least one gamma ray detector (52): and (b) making a first adjustment of gain of the detector using a measure of slope of a Compton scatter region of the spectrum (See Figs. 2 and 7 and col. 9, lines 21-32 and claim 1). Paske does not disclose of a second adjustment of the gain made by measuring location of an energy peak in the spectrum. Hubner discloses a method comprising additional step of making a second adjustment of the gain by: (a) measuring the location of an energy peak in the spectrum; and (b) adjusting the gain so that the location corresponds to a standard location for the energy peak (col. 20, lines 1-3 and lines 17-36). Hubner teaches it will be appreciated from the foregoing that a change in the gamma ray detector transfer characteristics due to variations in high voltage supplies such as drift and the like, will result in apparent shifts in the cesium monitor peak locations such as the channel locations corresponding to the various A-D converters. Moreover, also as previously indicated, such shifts may be corrected for by adjusting the high voltage supplies in response to the control signals

derived from detection of the monitor peaks so as to bring these perceived cesium monitor peak energy locations into the appropriate range or channel/window location (col. 20, lines 17-36). Therefore, it would have been obvious to modify the method disclosed by Paske, to include a second adjustment of the gain of the detector, to measure location of an energy peak, as disclosed supra by Hubner, to allow for a more versatile logging-while-drilling system.

Regarding claim 23, Hubner discloses the method comprising the additional step of making a third adjustment of the gain by (a) measuring locations of a plurality of energy peaks in the spectrum; (b) adjusting the gain so that each the locations of each of the plurality of peaks corresponds to a standard location for that peak (col. 20, lines 17-37).

Regarding claim 24, Hubner discloses the method comprising the additional steps of: system comprising a processor cooperating with the at least one detector wherein: (a) operationally connecting a processor to the at least one detector; (b) obtaining with the processor the spectrum comprising gamma ray count rate as a function of energy channels; and (c) making the first adjustment of the gain, within the processor by adjusting width of the energy channel as a function of the measure of slope (col. 20, lines 37-59).

Regarding claim 25, Hubner discloses the method comprising the additional step of making the second adjusting width of the gain, within the processor, by adjusting the width of the energy channels (col. 19, lines 58-68 and col. 20, lines 1-3 and lines 17-36).

Regarding claim 26, Hubner discloses the method comprising additional steps of: providing an adjustable high voltage power supply cooperating with the processor and the at least one detector; and making the third adjustment of the gain by adjusting the adjustable high voltage power supply thereby setting the gain of the at least one detector to a standard gain (col. 1, lines 39-51 and col. 4, lines 7-19).

Regarding claim 27, Paske discloses the method comprising the additional step of disposing that at least one detector in a detector channel at the periphery of a collar (See Generally Fig. 2 and col. 6, lines 32-53).

Regarding claim 28, Paske discloses the method comprising the additional steps of disposing two or more detectors (52)(53) each within detector channels that are angularly spaced around the periphery of a collar (15) (See Generally Fig. 2 and col. 6, lines 32-53).

Regarding claim 29, Hubner discloses the method comprising the additional steps of (a) measuring the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) combining the spectrum with calibration constants in the processor using a predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46).

Regarding claim 30, Hubner discloses the method comprising the additional step of obtaining at least one elemental concentration is measured as a function of depth within the borehole (col. 10, lines 10-34).

Regarding claim 31, Paske discloses the method comprising the additional step of obtaining the at least one element concentration as a function of azimuthal sector around the borehole (col. 7, lines 1-10).

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Paske et al (US 4,698,501)* and *Hubner et al (US 4,524,273)* as applied to claim 6 above, and further in view of *Chace et al (US 4,612,439).*

Regarding claim 12, Hubner discloses the system wherein (a) the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) the spectrum is combined with calibration constants in the processor using a predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46). Neither Hubner nor Paske specifically disclose the naturally occurring radioactive elements comprising potassium, uranium and thorium. Chace discloses a gamma ray well logging system wherein the naturally occurring radioactive elements comprise potassium, uranium and thorium (col. 1, lines 60-68 and col. 2, lines 1-2). Chace teaches a well logging instrument (10) of the type used for traversing subsurface earth formations to detect natural gamma radiation. Gamma rays are radiations originating within an atomic nucleus. A nucleus gives off excessive energy, gamma rays, as the result of radioactive decay or an induced nuclear reaction. Radioactive decay consists of the emission or capture of elementary and composite particles with their consequent transformations into daughter nuclei characterized by different atomic numbers and in some cases by different mass

numbers. Of particular interest in formation evaluation are potassium, uranium and thorium. Both uranium and thorium consist of three isotopes. The only unstable isotope of potassium is the nuclide potassium-40 (col. 2, lines 27-43). Therefore, it would have been obvious to modify the system suggested by Hubner and Paske, to include naturally occurring radioactive elements, as disclosed supra by Chace, to allow for a more versatile logging system.

8. Claims 14 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* as applied to claim 13 above, and further in view of *Jacobson et al (US 5,600,135 A).*

Regarding claim 14, Galford discloses a gamma ray logging-while-drilling system comprising: (a) at least one gamma ray detector (18) that measures a gamma ray energy spectrum (col. 7, lines 5-11); (b) a calibration source disposed near or within the at least one detector and emitting calibration radiation (i.e. calibration blocks) (col. 7, lines 36-50); and (c) dual gain circuitry comprising a standard amplification circuit and a high gain circuit (10, lines 13-25); (d) the spectrum is branched and input into the dual gain circuitry producing a standard gain spectrum and an amplified gain spectrum; (e) in the amplified gain spectrum, the observed position of a calibration peak from the calibration radiation is compared with a predetermined standard position for the calibration peak (col. 7, lines 5-50); and (f) results of the comparison are used to correct the standard gain spectrum to a standard detector gain (col. 11, lines 14-45). Galford does not disclose of adjusting voltage power supply. Jacobson discloses a gamma ray logging-while-drilling system comprising: (a) an adjustable high voltage power supply

cooperating with the at least one detector; and (b) a processor cooperating with the dual gain circuitry and the adjustable high voltage power supply; wherein (i) the comparison is made in the processor, (ii) the processor generates a calibration signal indicative of the comparison and inputs the calibration signal to the adjustable high voltage power supply, and (iii) high voltage supplied to the at least one detector by the adjustable high voltage power supply is adjustable in relation to, the calibration signal thereby correcting the standard gain spectrum to the standard detector gain (col. 7, lines 27-67 and col. 8, lines 1-24). Jacobson teaches gain stabilization by controlling the voltage supply level for the photomultiplier for the far detector (190) comprises the steps illustrated in the flow diagram (300) are implemented by the gain stabilization circuit (170) using conventional control algorithms such as, for example, proportional-integral-differential (P-I-D) control which in turn provides a control signal to the power supply (140) for the photomultiplier of the far detector 190. After inputting the measured spectrum in step (310), the number of counts in energy windows W1 and W2 are accumulated in step (320). The accumulated counts for the windows W1 and W2 are then depth filtered in step 330. The filtering step (330) will preferably include a correction for background radiation. In step (340), the ratio R of the number of counts in the first window W1 to the number of counts in the second window W2 is then calculated. The calculated ratio R is then compared with the reference value RG in step (350) by subtracting the reference value RG from the calculated ratio R to generate the error .DELTA.R. If the error .DELTA.R is greater than or equal to zero, then the gain of the far detector 190 is

increased in steps (360) and (370) by increasing the voltage supply level to the photomultiplier for the far detector 190. If the error .DELTA.R is less than zero, then the gain of the far detector (190) is reduced in steps (360) and (380) by reducing the voltage supply level to the photomultiplier for the far detector (190) (col. 7, lines 66-67 and col. 8, lines 1-23). Therefore, it would have been obvious to modify the system disclosed by Galford, to include an adjustable high voltage power supply, as disclosed supra by Jacobson, to allow for a more versatile logging system.

Regarding claim 17, Jacobson discloses the system wherein: (a) the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) the spectrum is combined with calibration constants of the at least one naturally occurring radioactive element (See Abstract and col. 7, lines 35-53).

Regarding claim 18, Jacobson discloses the system wherein the at least one elemental concentration is obtained as a function of depth within the borehole (See Abstract).

9. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* as applied to claim 13 above, and further in view of *Paske et al (US 4,698,501)*.

Regarding claim 15, Galford discloses a gamma ray logging-while-drilling system comprising: (a) at least one gamma ray detector (18) that measures a gamma ray energy spectrum (col. 7, lines 5-11); (b) a calibration source disposed near or within the at least one detector and emitting calibration radiation (i.e. calibration blocks) (col. 7,

lines 36-50); and (c) dual gain circuitry comprising a standard amplification circuit and a high gain circuit (10, lines 13-25); (d) the spectrum is branched and input into the dual gain circuitry producing a standard gain spectrum and an amplified gain spectrum; (e) in the amplified gain spectrum, the observed position of a calibration peak from the calibration radiation is compared with a predetermined standard position for the calibration peak (col. 7, lines 5-50); and (f) results of the comparison are used to correct the standard gain spectrum to a standard detector gain (col. 11, lines 14-45). Galford does not specifically disclose the system comprising a collar. Paske discloses a gamma ray logging-while-drilling system (10) comprising: a collar (15), wherein the at least one detector (52) is disposed in a detector channel at the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53). Paske teaches a section of drill collar (15) which includes a cylindrical inner bore (41) for the transmission of pressurized drilling fluid from the surface to the drilling bit (22). The collar (15) has been modified to include a pair of gamma radiation sources (42) and (43) each comprising a threaded insert to be received within threaded openings in the side walls of the collar (15). The sources of gamma radiation (42) and (43) may be any conventional sources such as cesium (137). While the system of the present invention will function adequately with a single source, the use of the two sources (42) and (43) insures that the radiation level is of a sufficient amplitude to produce large output signals from the detectors. Each of the two sources (42) and (43) are preferably located at a common axial position along the axis of the tool (10) and are illustrated as lying on a common diameter (44) which is perpendicular to the axial center line (46) of the drill collar (15) (col. 6, lines 14-31).

Therefore, it would have been obvious to modify the system disclosed by Galford, to include a collar, as disclosed supra by Paske, to allow for a more versatile logging system.

Regarding claim 16, Paske discloses the system further comprising a collar (15), wherein two or more detectors (52)(53) are each disposed within detector channels that are angularly spaced around the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53).

10. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* and *Jacobson et al (US 5,600,135 A)* as applied to claim 17 above, and further in view of *Paske et al (US 4,698,501).*

Regarding claim 19, Jacobson discloses the system wherein: (a) the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) the spectrum is combined with calibration constants of the at least one naturally occurring radioactive element (See Abstract and col. 7, lines 35-53). Neither Galford nor Jacobson does not disclose a concentration, of at least one element, obtained as a function of azimuthal sector. Paske discloses the system wherein at least one elemental concentration is measured as a function of azimuthal sector around the borehole (col. 7, lines 1-10). Paske teaches the novel geometry of the gamma-gamma radiation formation density logging system of the present invention is that the two detectors (52) and (53) are positioned symmetrically about the longitudinal axis of the collar (15) at equal azimuthal angles of separation from one another, i.e., 180 degrees, on diametrically opposite sides of the collar. The

two detector arrays (52) and (53) both lie on a common diameter (58) of a common circle within the plane (54) perpendicular to the axis of the drill collar (15). Both detectors are also spaced an equal distance from the radiation sources (42) and (43). As is also shown in FIG. 3, the system of the present invention produces accurate measurement of formation density regardless of the eccentric position of the drill collar within the borehole (12) because the distances between the eccentered tool and the borehole wall are automatically compensated mathematically as well as by the averaging effects which occur when the tool is rotated during the logging operation (col. 7, lines 1-10). Therefore, it would have been obvious to modify the system disclosed by Jacobson, to include concentration obtained as a function of azimuthal, as disclosed supra by Paske, to allow for a more versatile system.

Regarding claim 20, Galford discloses the system wherein the spectrum comprises gamma radiation from potassium, uranium and thorium (col. 1, lines 12-26).

11. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Paske et al (US 4,698,501)* and *Hubner et al (US 4,524,273)* as applied to claim 29 above, and further in view of *Chace et al (US 4,612,439)*.

Regarding claim 32, Hubner discloses the method comprising the additional steps of (a) measuring the spectrum comprises gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) combining the spectrum with calibration constants in the processor using a predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46). Neither Hubner nor Paske

specifically disclose the spectrum comprising gamma radiation from potassium, uranium and thorium. Chace discloses a gamma ray well logging system comprising a method wherein the spectrum comprises gamma radiation from potassium, uranium and thorium (col. 1, lines 60-68 and col. 2, lines 1-2). Chace teaches a well logging instrument (10) of the type used for traversing subsurface earth formations to detect natural gamma radiation. Gamma rays are radiations originating within an atomic nucleus. A nucleus gives off excessive energy, gamma rays, as the result of radioactive decay or an induced nuclear reaction. Radioactive decay consists of the emission or capture of elementary and composite particles with their consequent transformations into daughter nuclei characterized by different atomic numbers and in some cases by different mass numbers. Of particular interest in formation evaluation are potassium, uranium and thorium. Both uranium and thorium consist of three isotopes. The only unstable isotope of potassium is the nuclide potassium-40 (col. 2, lines 27-43). Therefore, it would have been obvious to modify the system suggested by Hubner and Paske, to include naturally occurring radioactive elements, as disclosed supra by Chace, to allow for a more versatile system.

12. Claims 34 and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* as applied to claim 33 above, and further in view of *Jacobson et al (US 5,600,135 A)*.

Regarding claim 34, Galford discloses a method for measuring gamma radiation while drilling a borehole, the method comprising the steps of: (a) measuring a gamma ray energy spectrum with at least one gamma ray detector (18) (col. 7, lines 5-11); (b)

disposing a calibration source near or within the at least one detector; (c) measuring within the gamma ray energy spectrum calibration radiation emitted by the calibration source (i.e. calibration block) (col. 7, lines 36-50); (d) providing a dual gain circuitry comprising a standard amplification circuit and a high gain circuit (col. 10, lines 13-25); (e) branching the spectrum into the dual gain circuitry thereby producing a standard gain spectrum and an amplified gain spectrum; (f) in the amplified gain spectrum, observing a position of a calibration peak resulting from the calibration radiation (col. 7, lines 5-50); (g) comparing the observed position with a predetermined standard position for the calibration peak; and (h) using the comparison to correct the standard gain spectrum to a standard detector gain (col. 11, lines 14-45). Galford does not disclose of adjusting voltage power supply. Jacobson discloses a method comprising; (a) providing an adjustable high voltage power supply which cooperates with the at least one detector; and (b) providing a processor that cooperates with the dual gain circuitry and the adjustable high voltage power supply; (c) making the comparison in the processor; (d) generating a calibration signal indicative of the comparison; (e) inputting the calibration signal to the adjustable high voltage power supply; and (f) adjusting high voltage supplied to the at least one detector by the adjustable high voltage power supply in relation to the calibration signal thereby correcting the standard gain spectrum to the standard detector gain (col. 7, lines 27-67 and col. 8, lines 1-24). Jacobson teaches gain stabilization by controlling the voltage supply level for the photomultiplier for the far detector (190) comprises the steps illustrated in the flow diagram (300) are implemented by the gain stabilization circuit (170) using conventional control algorithms

such as, for example, proportional-integral-differential (P-I-D) control which in turn provides a control signal to the power supply (140) for the photomultiplier of the far detector 190. After inputting the measured spectrum in step (310), the number of counts in energy windows W1 and W2 are accumulated in step (320). The accumulated counts for the windows W1 and W2 are then depth filtered in step 330. The filtering step (330) will preferably include a correction for background radiation. In step (340), the ratio R of the number of counts in the first window W1 to the number of counts in the second window W2 is then calculated. The calculated ratio R is then compared with the reference value RG in step (350) by subtracting the reference value RG from the calculated ratio R to generate the error .DELTA.R. If the error .DELTA.R is greater than or equal to zero, then the gain of the far detector 190 is increased in steps (360) and (370) by increasing the voltage supply level to the photomultiplier for the far detector 190. If the error .DELTA.R is less than zero, then the gain of the far detector (190) is reduced in steps (360) and (380) by reducing the voltage supply level to the photomultiplier for the far detector (190) (col. 7, lines 66-67 and col. 8, lines 1-23). Therefore, it would have been obvious to modify the system disclosed by Galford, to include an adjustable high voltage power supply, as disclosed supra by Jacobson, to allow for a more versatile logging method.

Regarding claim 37, Jacobson discloses the method comprising the additional steps of: (a) measuring the spectrum comprising gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) combining the spectrum with calibration constants in the processor using a

predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (See Abstract and col. 7, lines 35-53).

Regarding claim 38, Jacobson discloses the method comprising the additional step of obtaining the at least one elemental concentration as a function of depth within the borehole (See Abstract).

13. Claims 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* as applied to claim 33 above, and further in view of *Paske et al (US 4,698,501).*

Regarding claim 35, Galford discloses a method for measuring gamma radiation while drilling a borehole, the method comprising the steps of: (a) measuring a gamma ray energy spectrum with at least one gamma ray detector (18) (col. 7, lines 5-11); (b) disposing a calibration source near or within the at least one detector; (c) measuring within the gamma ray energy spectrum calibration radiation emitted by the calibration source (i.e. calibration block) (col. 7, lines 36-50); (d) providing a dual gain circuitry comprising a standard amplification circuit and a high gain circuit (col. 10, lines 13-25); (e) branching the spectrum into the dual gain circuitry thereby producing a standard gain spectrum and an amplified gain spectrum; (f) in the amplified gain spectrum, observing a position of a calibration peak resulting from the calibration radiation (col. 7, lines 5-50); (g) comparing the observed position with a predetermined standard position for the calibration peak; and (h) using the comparison to correct the standard gain spectrum to a standard detector gain (col. 11, lines 14-45). Galford does not specifically disclose a method comprising a collar. Paske discloses a method for measuring

gamma radiation while-drilling a borehole comprising the step of disposing the at least one detector (52) in a detector channel at the periphery of a collar (15) (See Generally Fig. 2 and col. 6, lines 32-53). Paske teaches a section of drill collar (15) which includes a cylindrical inner bore (41) for the transmission of pressurized drilling fluid from the surface to the drilling bit (22). The collar (15) has been modified to include a pair of gamma radiation sources (42) and (43) each comprising a threaded insert to be received within threaded openings in the side walls of the collar (15). The sources of gamma radiation (42) and (43) may be any conventional sources such as cesium (137). While the system of the present invention will function adequately with a single source, the use of the two sources (42) and (43) insures that the radiation level is of a sufficient amplitude to produce large output signals from the detectors. Each of the two sources (42) and (43) are preferably located at a common axial position along the axis of the tool (10) and are illustrated as lying on a common diameter (44) which is perpendicular to the axial center line (46) of the drill collar (15) (col. 6, lines 14-31). Therefore, it would have been obvious to modify the system disclosed by Galford, to include a collar, as disclosed supra by Paske, to allow for a more versatile logging method.

Regarding claim 36, Paske discloses the method comprising additional step of disposing two or more detectors (52)(53) within detector channels that angularly spaced around the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53).

14. Claims 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* and *Jacobson et al (US 5,600,135 A)* as applied to claim 37 above, and further in view of *Paske et al (US 4,698,501).*

Regarding claim 39, Jacobson discloses the method comprising the additional steps of: (a) measuring the spectrum comprising gamma radiation from at least one naturally occurring radioactive element in formation penetrated by a borehole; and (b) combining the spectrum with calibration constants in the processor using a predetermined relationship to obtain an elemental concentration of the at least one naturally occurring radioactive element (See Abstract and col. 7, lines 35-53). Neither Galford nor Jacobson does not disclose a concentration, of at least one element, obtained as a function of azimuthal sector. Paske discloses the method comprising the additional step of obtaining the at least one elemental concentration as a function of azimuthal sector around the borehole (col. 7, lines 1-10). Paske teaches the novel geometry of the gamma-gamma radiation formation density logging system of the present invention is that the two detectors (52) and (53) are positioned symmetrically about the longitudinal axis of the collar (15) at equal azimuthal angles of separation from one another, i.e., 180 degrees, on diametrically opposite sides of the collar. The two detector arrays (52) and (53) both lie on a common diameter (58) of a common circle within the plane (54) perpendicular to the axis of the drill collar (15). Both detectors are also spaced an equal distance from the radiation sources (42) and (43). As is also shown in FIG. 3, the system of the present invention produces accurate measurement of formation density regardless of the eccentric position of the drill collar

within the borehole (12) because the distances between the eccentered tool and the borehole wall are automatically compensated mathematically as well as by the averaging effects which occur when the tool is rotated during the logging operation (col. 7, lines 1-10). Therefore, it would have been obvious to modify the method disclosed by Jacobson, to include concentration obtained as a function of azimuthal, as disclosed supra by Paske, to allow for a more versatile logging method.

Regarding claim 40, Galford discloses the method wherein the spectrum comprises gamma radiation from potassium, uranium and thorium (col. 1, lines 12-26).

15. Claims 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* as applied to claim 41 above, and further in view of *Hubner et al (US 4,524,273).*

Regarding claim 42, Galford discloses a gamma radiation logging-while-drilling system for measuring elemental concentration of at least one naturally occurring radioactive element in a formation penetrated by a borehole, the system comprising: (a) at least one gamma ray detector (18) (col. 7, lines 5-11); (b) a calibration source in the vicinity of the at least one gamma ray detector; wherein (c) the gamma ray detector measures a gamma ray spectrum comprising a first component from the at least one naturally occurring radioactive element and a second component from the calibration source; (d) a first detector gain correction is determined from features of the first component; (e) a second detector gain correction is determined from the second component; and (f) the first and the second gain corrections are combined to correct for gain shift in the gamma ray detector (See Abstract and col. 7, lines 5-50, col. 10,

lines 13-25 and col. 11, lines 14-45). Galford does not disclose a processor to obtain elemental concentration of at least one naturally occurring radioactive element. Hubner discloses the system comprising a processor, wherein features of the first component are combined with calibration constants in the processor using a predetermined relationship to obtain the elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46). Hubner teaches it may be desirable to obtain average count rates over a preselected calibration time interval to obtain such count rates for data derived at preselected borehole elevations (col. 8, lines 36-46). Therefore, it would have been obvious to modify the system disclosed by Galford, to include a calibration constants in the processor, as disclosed supra by Hubner, to allow for a more versatile logging system.

Regarding claim 43, Hubner discloses the system wherein the at least one elemental concentration is obtained as a function of depth within the borehole (col. 10, lines 10-34).

16. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A) and Hubner et al (US 4,524,273),* as applied to claim 42 above, and further in view of *Paske et al (US 4,698,501).*

Regarding claim 44, Galford discloses a gamma radiation logging-while-drilling system for measuring elemental concentration of at least one naturally occurring radioactive element in a formation penetrated by a borehole, the system comprising: (a) at least one gamma ray detector (18) (col. 7, lines 5-11); (b) a calibration source in the vicinity of the at least one gamma ray detector; wherein (c) the gamma ray detector

measures a gamma ray spectrum comprising a first component from the at least one naturally occurring radioactive element and a second component from the calibration source; (d) a first detector gain correction is determined from features of the first component; (e) a second detector gain correction is determined from the second component; and (f) the first and the second gain corrections are combined to correct for gain shift in the gamma ray detector (See Abstract and col. 7, lines 5-50, col. 10, lines 13-25 and col. 11, lines 14-45). Galford does not disclose a processor to obtain elemental concentration of at least one naturally occurring radioactive element. Hubner discloses the system comprising a processor, wherein features of the first component are combined with calibration constants in the processor using a predetermined relationship to obtain the elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46). Neither Galford nor Hubner disclose a concentration, of at least one element, obtained as a function of azimuthal sector. Paske discloses the system wherein at least one elemental concentration as a function of azimuthal sector around the borehole (col. 7, lines 1-10). Paske teaches the novel geometry of the gamma-gamma radiation formation density logging system of the present invention is that the two detectors (52) and (53) are positioned symmetrically about the longitudinal axis of the collar (15) at equal azimuthal angles of separation from one another, i.e., 180 degrees, on diametrically opposite sides of the collar. The two detector arrays (52) and (53) both lie on a common diameter (58) of a common circle within the plane (54) perpendicular to the axis of the drill collar (15). Both detectors are also spaced an equal distance from the

radiation sources (42) and (43). As is also shown in FIG. 3, the system of the present invention produces accurate measurement of formation density regardless of the eccentric position of the drill collar within the borehole (12) because the distances between the eccentered tool and the borehole wall are automatically compensated mathematically as well as by the averaging effects which occur when the tool is rotated during the logging operation (col. 7, lines 1-10). Therefore, it would have been obvious to modify the method disclosed by Galford and Hubner, to include concentration obtained as a function of azimuthal, as disclosed supra by Paske, to allow for a more versatile logging system.

17. Claims 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* as applied to claim 41 above, and further in view of *Hubner et al (US 4,524,273).*

Regarding claim 46, Galford discloses a method for measuring, while drilling a borehole, elemental concentration of at least one naturally occurring radioactive element contained in formation penetrated by the borehole, the method comprising the steps of: (a) conveying at least one gamma ray detector (18) within the borehole (col. 7, lines 5-11); (b) disposing a calibration source in the vicinity of the at least one gamma ray detector; (c) measuring with the at least one gamma ray detector, a gamma ray spectrum comprising a first component from the calibration source; (d) determining a first detector gain correction from features of the first component; (e) determining a second detector gain correction from the second component; (f) combining the first and the second detector gain correction to correct for gain shift in

the at least one gamma ray detector (See Abstract and col. 7, lines 5-50, col. 10, lines 13-25 and col. 11, lines 14-45). Galford does not disclose a processor to obtain elemental concentration of at least one naturally occurring radioactive element. Hubner discloses the method comprising the additional steps of combining features of the first component with calibration constants using a predetermined relationship to obtain the elemental concentration of the at least one naturally occurring radioactive element (col. 8, lines 36-46). Hubner teaches it may be desirable to obtain average count rates over a preselected calibration time interval to obtain such count rates for data derived at preselected borehole elevations (col. 8, lines 36-46). Therefore, it would have been obvious to modify the system disclosed by Galford, to include a calibration constants in the processor, as disclosed supra by Hubner, to allow for a more versatile logging method.

Regarding claim 47, Hubner discloses the method comprising the additional step of obtaining the at least one elemental concentration as a function of azimuthal sector around the borehole (col. 10, lines 10-34).

18. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Galford et al (US 5,120,955 A)* and *Jacobson et al (US 5,600,135 A)* as applied to claim 45 above, and further in view of *Paske et al (US 4,698,501)*.

Regarding claim 48, Galford discloses a method for measuring, while drilling a borehole, elemental concentration of at least one naturally occurring radioactive element contained in formation penetrated by the borehole, the method comprising the steps of: (a) conveying at least one gamma ray detector (18) within the borehole (col.

7, lines 5-11); (b) disposing a calibration source in the vicinity of the at least one gamma ray detector; (c) measuring with the at least one gamma ray detector, a gamma ray spectrum comprising a first component from the calibration source; (d) determining a first detector gain correction from features of the first component; (e) determining a second detector gain correction from the second component; (f) combining the first and the second detector gain correction to correct for gain shift in the at least one gamma ray detector (See Abstract and col. 7, lines 5-50, col. 10, lines 13-25 and col. 11, lines 14-45). Neither Galford nor Jacobson does not disclose a concentration, of at least one element, obtained as a function of azimuthal sector. Paske discloses the method comprising additional step of obtaining the at least one elemental concentration as a function of depth within the borehole (col. 7, lines 1-10). Paske teaches the novel geometry of the gamma-gamma radiation formation density logging system of the present invention is that the two detectors (52) and (53) are positioned symmetrically about the longitudinal axis of the collar (15) at equal azimuthal angles of separation from one another, i.e., 180 degrees, on diametrically opposite sides of the collar. The two detector arrays (52) and (53) both lie on a common diameter (58) of a common circle within the plane (54) perpendicular to the axis of the drill collar (15). Both detectors are also spaced an equal distance from the radiation sources (42) and (43). As is also shown in FIG. 3, the system of the present invention produces accurate measurement of formation density regardless of the eccentric position of the drill collar within the borehole (12) because the distances between the eccentered tool and the borehole wall are automatically compensated

mathematically as well as by the averaging effects which occur when the tool is rotated during the logging operation (col. 7, lines 1-10). Therefore, it would have been obvious to modify the method disclosed by Jacobson, to include concentration obtained as a function of azimuthal, as disclosed supra by Paske, to allow for a more versatile logging method.

19. Claims 50-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hubner et al (US 4,524,273,)* as applied to claim 49 above, and further in view of *Paske et al (US 4,698,501).*

Regarding claim 50, Hubner discloses a gamma ray logging-while-drilling system comprising (a) at least one gamma ray detector; and a processor operationally connected to the at least one detector; wherein (c) the gamma ray detector cooperates with the processor to yield a spectrum comprises gamma ray count rate recorded as a function of energy channel (col. 19, lines 58-68 and col. 20, lines 1-3 and lines 17-59). Hubner does not disclose of a collar in the periphery of a detector. Paske disclose the system further comprising a collar (15), wherein the at least one detector (52) is disposed in a detector channel at the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53). Paske teaches s significant aspect of the novel geometry of the gamma-gamma radiation formation density logging system of the present invention is that the two detectors 52 and 53 are positioned symmetrically about the longitudinal axis of the collar 15 at equal azimuthal angles of separation from one another, i.e., 180 degrees, on diametrically opposite sides of the collar. The two detector arrays 52 and 53 both lie on a common diameter 58 of a common circle within the plane 54

perpendicular to the axis of the drill collar 15. Both detectors are also spaced an equal distance from the radiation sources 42 and 43. As is also shown in FIG. 3, the system of the present invention produces accurate measurement of formation density regardless of the eccentric position of the drill collar within the borehole 12 because the distances between the eccentered tool and the borehole wall are automatically compensated mathematically as well as by the averaging effects which occur when the tool is rotated during the logging operation. Therefore, it would have been obvious to modify the system disclosed by Hubner, to include a collar in the periphery of the detector, as suggested supra by Paske, to allow for a more versatile logging system.

Regarding claim 51, Paske discloses the system further comprising a collar (15), wherein two or more detectors (52)(53) are disposed in a detector channel at the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53).

20. Claims 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hubner et al (US 4,524,273,)* as applied to claim 53 above, and further in view of *Paske et al (US 4,698,501)*.

Regarding claim 54, Hubner discloses a method for measuring gamma radiation while drilling a borehole, the method comprising the steps of: (a) disposing at least one gamma ray detector within the borehole; (b) operationally connecting a processor to the at least one detector; and (c) with the processor cooperating with the at least one gamma ray detector, measuring an energy spectrum of the gamma radiation comprising gamma ray count rate recorded as a function of energy channel (col. 19, lines 58-68 and col. 20, lines 1-3 and lines 17-59). Hubner does not disclose of a collar in the

periphery of a detector. Paske disclose the method comprising the additional step of disposing the at least one detector channel at the periphery of the collar (See Generally Fig. 2 and col. 6, lines 32-53). Paske teaches s significant aspect of the novel geometry of the gamma-gamma radiation formation density logging system of the present invention is that the two detectors (52) and (53) are positioned symmetrically about the longitudinal axis of the collar (15) at equal azimuthal angles of separation from one another, i.e., 180 degrees, on diametrically opposite sides of the collar. The two detector arrays (52) and (53) both lie on a common diameter (58) of a common circle within the plane (54) perpendicular to the axis of the drill collar 15. Both detectors are also spaced an equal distance from the radiation sources (42) and (43). As is also shown in FIG. 3, the system of the present invention produces accurate measurement of formation density regardless of the eccentric position of the drill collar within the borehole (12) because the distances between the eccentered tool and the borehole wall are automatically compensated mathematically as well as by the averaging effects which occur when the tool is rotated during the logging operation. Therefore, it would have been obvious to modify the system disclosed by Hubner, to include a collar in the periphery of the detector, as suggested supra by Paske, to allow for a more versatile logging method.

Regarding claim 55, Paske discloses the method comprising the additional step of disposing two or more detectors (52)(53) within detector channels angularly spaced around the periphery of a collar (See Generally Fig. 2 and col. 6, lines 32-53).

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

23. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP

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PRIMARY EXAMINER